DOCUMENT RESUME

ED 226 268 CG 016 461

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TITLE Attitudes toward Specific Computer Applications: Belief, Experiential, and Personality Correlates.
PUB DATE Aug 82
NOTE 25p.; Paper presented at the Annual Convention of the American Psychological Association (90th, Washington, DC, August 23-27, 1982).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS College Students; *Computer Literacy; *Computer Oriented Programs; Counselor Role; Decision Making; Higher Education; *Personality Traits; Predictor Variables; Psychology; Recordkeeping; *Social Attitudes; Student Attitudes; *Values

ABSTRACT

Although several surveys of attitudes toward computers have been conducted, little is known about attitudes toward specific computer applications. College students (N=203) were surveyed about their attitudes toward computer applications. Results indicated that there are three clusters of computer applications about which respondents hold similar attitudes: quantitative (e.g., processing skills); decision making (e.g., diagnosing medical problems); and record keeping (e.g., storing information about criminals). Students were favorable toward quantitative and record-keeping applications but rejected decision-making applications, especially those involving decisions traditionally made by psychologists. Experience with computers and perceptions of the computer as effecient, humanizing, and enjoyable correlated significantly with attitudes toward specific applications. Locus of control and interpersonal trust were not related to attitudes. The findings suggest that the values brought to bear on a decision may depend upon the nature of the computer application and that psychologists in particular should be concerned about the extent to which, in the interests of economy and efficiency, they may contribute to an individual's feelings of dehumanization. (JAC)

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ED226268

Attitudes Toward Specific Computer Applications: Belief, Experiential, and Personality Correlates

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This paper is based on a poster session presentation at the meetings of the American Psychological Association, Washington, D.C., August, 1982.

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Attitudes Toward Specific Computer Applications:

Belief, Experiential, and Personality Correlates

The widespread availability of computers has had an important impact on psychology over the long term with respect to data analysis, laboratory control, and theory construction (Green, 1967), but also more recently in education (Apter & Barrett, 1973), guidance counseling (Harris, 1978), and psychotherapy (Erdman, Greist, Klein, Jefferson, & Getto, 1981). Regarding the increased use of computers, Bergmark (1980) noted the danger that new computer applications may be undertaken simply because the capability exists, without reflection on the acceptability of these applications in light of societal values. Bergmark further argued that the capabilities of computers merely present people with decisions about how computers ought to be used. If such decisions are to be made, it is important to know how people in our society react to specific uses of the computer, especially those involving traditional activities of the psychologist.

Although several surveys of attitudes toward computers have been conducted (Ahl, 1977; Lee, 1970; Schiller & Gilchrist, 1971; Zoltan & Chapanis, 1981), little is known about attitudes toward specific computer applications. In the only study that addressed this issue, Schiller and Gilchrist (1971) asked a national sample of respondents if 15 uses of computers should be increased or decreased. A majority favored decreased usage of the computer to match people for dating and to send mail advertisements to the home, while a majority favored increased usage in all other areas mentioned, including control of factory machinery, medical diagnoses, and compiling citizen information files. Although this survey provided valuable information regarding attitudes toward specific applications, it did not include some of the most controversial applications, such as the use of computers to diagnose psychological problems or to provide

psychological counseling.

In view of the limited information on this topic, the present study had two major goals: (1) to determine the attitudes of a sample of college students toward 32 computer applications, with a special interest in psychological applications; and (2) to determine if these attitudes were related to experience with computers, beliefs about computers, or personality characteristics of the respondents. Although the present survey dealt only with college students, this subject population is a reasonable choice because students are often the focus of new computer techniques, especially psychological applications such as career (e.g., Chapman, Katz, Norris, & Pears, 1977) and psychological counseling (e.g., Wagman, 1980; Wagman & Kerber, 1980).

The 32 applications in this study were selected from literature on the "computer revolution," but did not include hypothetical applications. In each case, computers currently are used (e.g., to control airplane traffic) or are being tested for use (e.g., to diagnose medical problems) in the manner described.

Several hypotheses were generated regarding the correlates of attitudes toward specific computer applications. First, experience with computers should be associated with favorable judgments of the appropriateness of the applications. Several studies have indicated that experienced computer users generally have more favorable attitudes toward computers than inexperienced users (Mathis, Smith, & Hansen, 1970; Rosenberg, Reznikoff, Stroebel, & Ericson, 1967; Zoltan & Chapanis, 1981). Second, more favorable beliefs about computers also may be associated with favorable judgments of specific applications. Although no research has been done on this issue, it seems intuitively reasonable that, for example, the perception of computers as efficient would be associated with more favorable attitudes toward computer use. Third, an

individual's locus of control (Rotter, 1966) and degree of interpersonal trust (Rotter, 1967) may be related to judgments of the appropriateness of computer applications. Coovert and Goldstein (1980) found that internals have more favorable attitudes toward computers than externals, while Lee (1970) found that an attitude of general trust about people is associated with more favorable attitudes toward computers. Finally, among those who have had experience with computers, a greater number of errors while learning to use the computer may be associated with unfavorable judgments of specific applications. Mathis, Smith, and Hansen (1970) found that the more errors students made while using a computer-assisted instruction (CAI) program, the less positive their attitude toward computers.

Method

Subjects

Subjects were 203 undergraduates from a small liberal arts college. Volunteers were recruited through announcements in various introductory level non-major courses and through notices sent to student mailboxes; subjects were paid two dollars for their assistance. All subjects previously had used a computer terminal on campus to register for college courses. Because this interaction required no knowledge of the computer (a set of highly specific instructions were given to each student) and involved all respondents, it was not included in the measures of experience with computers.

Questionnaire

In the first section, respondents indicated their sex, major, graduating class, number of computer science courses taken (including current enrollment), experience with computers in non-computer science courses, and job experience with computers. Respondents also indicated the nature of their experience with computers by checking as many of the following as applied: written your own

program, used a program you wrote, used a program written by someone else, and/or used a computer to prepare a written document. The number of these items checked constituted a measure of the variety of experience with computers. In addition, respondents who checked at least one of these experiences rated how difficult it was for them to learn to use the computer (1 = extremely easy, I made few errors while learning; 7 = extremely difficult, I made many errors while learning).

Beliefs about computers were assessed with 41 semantic differential items developed by Zoltan and Chapanis (1981). Respondents were instructed to use the pairs of adjectives to give their frank opinion of electronic computers. Attitudes toward computer applications were examined with 32 Likert-type scales, each describing a specific computer use. For each statement, respondents were told to assume that the use of human beings to accomplish the same task would be reduced because of the use of computers. Examples of both types of scales are shown in Table 1.

Insert Table 1 about here

The final section of the questionnaire consisted of Rotter's Locus of Control Scale (Rotter, 1966) and Interpersonal Trust Scale (Rotter, 1967).

Procedure

Questionnaires were completed anonymously in groups of as many as 65 respondents during November 1981.

Results

The Sample

Of the 203 respondents (87 males; 116 females), 25% were freshmen, 36% sophomores, 22% juniors, and 18% seniors. Fifteen majors were represented with

the largest percentage of respondents in the social sciences (50%), followed by the humanities (21%), the natural sciences (19%), and undeclared (10%). A majority had some experience with computers (67%); 27% had previously taken a computer science course, 24% were currently enrolled in computer science, 17% had computer experience in non-computer science courses, and 11% had used a computer on the job. Of the total sample, 41% had written a computer program, 33% had used a program they wrote, 44% had used a program written by someone else, and 33% had used a computer to prepare a written document.

Experience With Computers

In the present sample, experience with computers was equivalent for males and females; 72% of the females and 60% of the males had some computer experience, χ^2 (1) = 2.59, $p > .10$. With respect to graduating class, the longer the respondents had been in college, the more likely they were to have had some computer experience: freshmen, 40%; sophomores, 67%; juniors, 82%; and seniors, 83%, χ^2 (3) = 24.99, $p < .01$.

For the analyses regarding major, respondents were grouped into three categories: natural science, humanities, and social science. Students who had not yet declared their majors were excluded from these analyses (20 respondents). Natural science majors (84%) were somewhat more likely to have had some computer experience than either humanities (70%) or social science (65%) majors, χ^2 (2) = 5.01, $p < .10$. Natural science majors (32%) were more likely than humanities (5%) or social science (20%) majors to have had computer experience in non-computer science courses, χ^2 (2) = 9.83, $p < .01$. Also, natural science majors (61%) were more likely to have written their own computer program than humanities (44%) or social science (37%) majors, χ^2 (2) = 6.10, $p < .05$.

Beliefs About Computers

A principal axis factor analysis was performed on the 41 semantic differential items. On the basis of the eigenvalues and interpretability, four factors were extracted that accounted for 36% of the variance. A varimax rotation yielded four orthogonal factors. Items with loadings above .40 were identified with a particular factor and are shown in Table 2. Means and standard deviations of the items on each factor are listed in Table 3. Variations in beliefs about computers can be summarized along

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Insert Tables 2 and 3 about here

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four dimensions: efficiency (factor 1), humanization (factor 2), enjoyment (factor 3), and difficulty (factor 4). Factor scores were computed for each subject by averaging the responses to items on each factor. Means and standard deviations of the factor scores also are presented in Table 3. On the average, respondents perceived computers to be quite efficient, slightly dehumanizing, slightly enjoyable, and neutral in difficulty.

Attitudes Toward Computer Applications

A principal axis factor analysis also was performed on the 32 Likert-type items, yielding three factors (37% of the variance). Once again, the factor matrix was rotated using the varimax procedure, and items with loadings above .40 identified the factors. Factor loadings are shown in Table 4; means and standard deviations of the items and of the factor scores are shown in Table 5. There are three clusters of computer

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Insert Tables 4 and 5 about here

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applications about which respondents tend to hold similar attitudes: quantitative applications (factor 1), decision-making applications (factor 2), and record-keeping applications (factor 3). A series of paired *t*-tests indicated that all three factor score means differ significantly from one another at the .01 level (1 versus 2, t (202) = 37.50; 1 versus 3, t (202) = 14.29; 2 versus 3, t (202) = 18.32). On the average, respondents were quite favorable toward quantitative applications, somewhat favorable toward record-keeping applications, and somewhat unfavorable toward decision-making applications.

Correlates of Attitudes Toward Computer Applications

Three stepwise multiple regression analyses were performed predicting attitudes toward quantitative, decision-making, and record-keeping applications of the computer from eleven predictors: sex of respondent, number of computer science courses, experience with computers in non-computer science courses, job experience with computers, variety of computer experience, locus of control, interpersonal trust, and judgments of the efficiency, humanization, enjoyment, and difficulty of computers.

In the first analysis, the greater the perceived efficiency of computers and the more computer science courses taken, the more favorable respondents were toward quantitative applications, $R = .44$, F (2, 200) = 24.52, $p < .01$. In the second analysis, respondents who perceived the computer as more humanizing, who had taken more computer science courses, and who were male, were more favorable toward decision-making applications, $R = .53$, F (3, 199) = 25.35, $p < .01$. Finally, in the third analysis, respondents who perceived the computer as more enjoyable and as more humanizing were more favorable toward record-keeping applications, $R = .28$, F (2, 200) = 8.66, $p < .01$. The multiple correlations corrected for shrinkage (Rozeboom, 1978) were .42, .5[illegible], and .24, respectively.

Errors While Learning the Computer

Among those respondents who had some previous experience with computers, the more errors committed while learning to use the computer, the more respondents described the computer as difficult, $r = -.40$, $df = 130$, $p < .01$. The number of errors committed was unrelated to descriptions of the computer as efficent ($r = -.05$), humanizing ($r = -.11$), or enjoyable ($r = .08$). Regarding attitudes toward specific computer applications, respondents who committed more errors were more favorable toward quantitative, $r = -.22$, $df = 130$, $p < .01$, and decision-making, $r = -.22$, $df = 130$, $p < .01$, applications. The correlation between errors and judgments regarding record-keeping applications was not significant ($r = -.11$).

Discussion

The results indicate that respondents viewed the computer as efficient and enjoyable, but also as dehumanizing. They were quite favorable regarding quantitative applications of the computer (e.g., to process bills), somewhat favorable regarding the creation of information files about people on the computer (e.g., to store records about criminals), but moderately unfavorable regarding the use of computers to make decisions about people (e.g., to diagnose psychological problems). As predicted, experience with computers (in the form of computer science courses) was associated with favorable attitudes, but only with respect to quantitative and decision-making applications. Also as predicted, more favorable beliefs about computers were associated with favorable judgments of the appropriateness of specific applications. Perceived efficiency was associated with favorable attitudes toward quantitative applications, perceptions of the computer as humanizing were associated with favorable attitudes toward both decision-making and record-keeping applications, and enjoyment of the computer was related to favorable attitudes toward

record-keeping applications. Unexpectedly, females reacted more negatively to decision-making applications than males.

Several findings contradicted the predictions for this study. Locus of control and interpersonal trust were unrelated to attitudes. In addition, greater difficulty in learning to use the computer actually was associated with more favorable attitudes toward quantitative and decision-making applications. The latter findings are somewhat puzzling unless the association of the "infallible" computer with errors and the resulting frustration somehow makes the machine more human. Although the nonsignificant correlation between difficulty and the humanization factor does not support this interpretation, several correlations with individual semantic differential items may lend some credence to the proposed explanation. Specifically, greater difficulty in learning was associated with a view of the computer as more personalizing, $r = -.16$, $df = 130$, $p < .05$, more personal, $r = -.19$, $df = 130$, $p < .05$, and more humanizing, $r = -.19$, $df = 130$, $p < .05$.

Research by Zoltan and Chapanis (1981) with professional persons indicated that variations in beliefs about computers could be summarized along six dimensions: efficiency, dehumanization, the computer as a partner to man, the computer as a "slave" to man, enjoyment, and difficulty. Responses to the semantic differential items in the present study yielded factors that correspond very closely to four of these factors, despite different populations. These four dimensions may represent the most important features of the computer for non-computer scientists.

Discussions about the computer often center on qualities that these machines are believed to possess. For example, Timnick (1982) focused on perceptions of the computer as infallible and emphasized the dangers inherent in a reluctance to challenge computer output. In the present survey, 22% of the

respondents viewed the computer as extremely or quite infallible, while 14% viewed the computer as quite or extremely fallible. Ratings of the computer as infallible were uncorrelated with either the number of computer courses taken (r = .05) or the variety of experiences with the computer (r = -.04). In his discussion of the "personality" of the interactive computer, Berkeley (1977) stressed the inexhaustible patience of the machine. In the present survey, 35% of the respondents judged the computer to be extremely or quite patient, while 13% perceived the computer to be extremely or quite impatient. Once again, the number of computer courses taken (r = -.07) and the variety of computer experiences (r = .01) were uncorrelated with beliefs regarding computer patience. Finally, Mandell (1981) begins his introductory book on data processing by emphasizing that computers possess no independent intelligence and that computers have an IQ of zero. In sharp contrast with these statements, 63% of the survey respondents rated the computer as extremely or quite intelligent while only 11% judged the computer to be extremely or quite simple-minded. In this case, more computer science courses (r = .15, df = 201, $p < .05$) and a greater variety of experiences with computers (r = .18, df = 201, $p < .01$) were associated with perceptions of the computer as less intelligent. Clearly, some authors would argue that many of the survey respondents have inaccurate beliefs about electronic computers. Perhaps those who instruct students in computer use should consider the extent to which they should actively attempt to modify such beliefs. Also, it is interesting to note that items measuring beliefs regarding the infallibility, patience, and intelligence of computers did not appear on any of the four belief factors. Of course, these dimensions still may be highly important variables related to the perception of computers, but in this sample, these dimensions do not appear to be the major qualities that differentiate beliefs about computers.

Survey results (e.g., Zoltan & Chapanis, 1981) and discussions of the social impact of computers (e.g., Mathews, 1980) suggest that one major fear regarding computers is the belief that they are dehumanizing. But exactly what does it mean to say that computers are dehumanizing? Some authors discuss the potentially dehumanizing effects of computers on society in general. For example, dehumanization may involve the anonymity generated by treating human beings as numbers rather than as persons (Shepard, 1980) or reductions in feelings of self-worth as computerization eliminates work for many people (Tolliver, 1980). Other authors discuss the effects of computers on people who interact with them. Zimbardo (1980) implies that dehumanization involves isolation and a loss of naturalness in relations with other people as exemplified by the behavior of computer addicts (Ingber, 1981). Orcutt and Anderson (1977) argue that dehumanization implies a change in the nature of human communication precipitated by computer interaction in which the goal is effective control rather than mutual understanding. In other words, dehumanization may involve interacting with human beings in ways that are more appropriate to the reduced communication capabilities of the computer, thus failing to use the added capabilities of human interactants, e.g., nonverbal communication.

In this survey, respondents appeared to view dehumanization as the removal of active decision-making about people from the realm of human activity. In Computer Power and Human Reason, Weizenbaum (1976) argued that because of important differences between human beings and computers, there are certain computer applications that ought not be implemented, for example, the use of computers as psychotherapists. Weizenbaum suggested that computers should not be designed to make psychiatric, judicial, and other important decisions about people because these tasks require interpersonal respect, human understanding,

and love. The respondents in this study seem to agree with Weizenbaum as shown by their generally unfavorable reaction to decision-making applications of the computer. In addition, computer applications involving decisions traditionally made by psychologists were rejected quite strongly, especially the use of computers to provide psychological counseling. This suggests that psychologists in particular should be concerned about the extent to which they contribute to feelings of dehumanization in the interest of economy and efficiency.

According to the Bureau of Labor Statistics, 10 million people will be using video-display terminals at work by 1985; by 1990, one out of every three office desks will have a computer terminal (Jones, 1982). While concern has been expressed about the physical effects of using video-display terminals (e.g., neck and back pains, headaches, eyestrain, etc.), it is also important to consider the social and psychological effects of increasing computer use. Research is needed to examine the potentially dehumanizing effects of computers on society in general and on computer users.

Bergmark (1980) discussed two possible societal reactions to computer innovations. In one case, new capabilities lead to application without any value considerations, while, in the other case, new capabilities lead to a careful consideration of the potential applications in light of societal values. Chapanis (1965) also has stressed the importance of value considerations when dividing occupational functions between people and machines. In our society, it seems that the application of new computer technology always involves some consideration of values, primarily the dual concerns of economy and efficiency. Humanists would argue that a concern with the potentially dehumanizing effects of computers also should be considered when making decisions about new uses of the computer. The present survey indicates that the values brought to bear on a decision may depend upon the nature of the computer application: efficiency is

an important consideration regarding quantitative applications of the computer, while decision-making and record-keeping applications involve consideration of the potentially dehumanizing effects of the computer. Clearly, further research is needed to clarify both the clusters of computer applications about which respondents hold similar attitudes and the values that should be considered when making decisions about those applications.

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Table 1

Sample Survey Items

Semantic Differential Items

Extremely\Quite\Slightly\Neutral\Slightly\Quite\Extremely

Stimulating	1	2	3	4	5	6	7	Dull
Adaptable	1	2	3	4	5	6	7	Unadaptable
Conventional	1	2	3	4	5	6	7	Unusual
Fun	1	2	3	4	5	6	7	Dreary

Likert-type Items

Computers should be used to check credit references.

1	2	3	4	5	6	7
strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree

Computers should be used to diagnose medical problems.

1	2	3	4	5	6	7
strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree

Computers should be used to diagnose psychological problems.

1	2	3	4	5	6	7
strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree

Computers should be used to electronically transfer funds from one financial institution to another.

1	2	3	4	5	6	7
strongly agree	agree	slightly agree	neutral	slightly disagree	disagree	strongly disagree

Table 2

Factor Loadings for Belief Items With Loadings of .4 or Greater (Absolute Value)

Belief Items		Factors I	II	III	IV
precise	/inexact	.47	-.08	.02	-.08
dependable	/undependable	.65	.12	.01	-.12
trustworthy	/untrustworthy	.44	.16	.10	.01
effective	/ineffective	.59	.07	.16	-.11
efficient	/inefficient	.60	.07	-.03	-.06
reliable	/unreliable	.70	.26	-.02	-.08
personalizing	/depersonalizing	.07	.82	.13	-.01
flexible	/rigid	.12	.40	.15	-.28
personal	/impersonal	.04	.77	.23	.02
warm	/cold	.04	.61	.21	-.24
humanizing	/dehumanizing	.04	.78	.17	-.00
stimulating	/dull	.10	.16	.59	.01
fun	/dreary	.02	.05	.77	-.09
desirable	/undesirable	.38	.18	.43	-.11
pleasing	/disgusting	.23	.21	.56	-.26
enjoyable	/unpleasant	.18	.14	.81	-.15
difficult	/easy	.12	-.09	-.26	.55
demanding	/obliging	.05	.11	-.13	.49
frustrating	/satisfying	-.03	-.12	-.27	.45
bossy	/obedient	-.15	.10	.02	.51
dominant	/submissive	-.09	-.05	.03	.51

Table 3

Means and Standard Deviations of Belief Items and Factor Scores

1 thru 7		Mean	Standard Deviation
precise	/inexact	1.51	.82
dependable	/undependable	2.23	1.09
trustworthy	/untrustworthy	2.65	1.14
effective	/ineffective	1.82	.86
efficient	/inefficient	1.70	.79
reliable	/unreliable	2.20	1.04
FACTOR 1: EFFICIENCY		2.02	.66
personalizing	/depersonalizing	5.30	1.42
flexible	/rigid	4.25	1.79
personal	/impersonal	5.28	1.58
warm	/cold	5.12	1.31
humanizing	/dehumanizing	5.28	1.31
FACTOR 2: HUMANIZATION		5.04	1.13
stimulating	/dull	2.81	1.20
fun	/dreary	2.41	1.16
desirable	/undesirable	2.47	1.41
pleasing	/disgusting	3.31	1.13
enjoyable	/unpleasant	2.86	1.18
FACTOR 3: ENJOYMENT		2.77	.91
difficult	/easy	3.90	1.52
demanding	/obliging	3.71	1.41
frustrating	/satisfying	3.44	1.50
bossy	/obedient	4.44	1.53
dominant	/submissive	3.59	1.45
FACTOR 4: DIFFICULTY		3.81	.96

Table 3, Continued

1 thru 7		Mean	Standard Deviation
adaptable	/unadaptable	2.25	1.16
conventional	/unusual	3.23	1.66
noisy	/quiet	4.45	1.56
predictable	/haphazard	2.85	1.40
complicated	/simple	2.92	1.50
weak	/powerful	5.81	1.15
formal	/informal	2.67	1.44
organized	/disorganized	1.47	.86
hindering	/helpful	5.64	1.33
intelligent	/simple-minded	2.60	1.83
cooperative	/obstinate	3.25	1.55
affordable	/costly	5.30	1.51
patient	/impatient	3.41	1.65
systematic	/random	1.56	.80
threatening	/unthreatening	3.73	1.50
challenging	/mundane	2.23	1.27
clear	/confusing	3.25	1.52
infallible	/fallible	3.88	1.55
fast	/slow	1.64	.87
forgiving	/unforgiving	4.20	1.25

Table 4

Factor Loadings for Attitude Items With Loadings of .4 or Greater (Absolute Value)

Computers should be used to...	Factors I	II	III
check credit references	.41	.08	.27
electronically transfer funds	.50	.02	.11
register for college courses	.51	.15	.10
prepare payroll checks	.66	.12	.17
count votes in an election	.52	.05	-.05
control factory machinery	.41	.29	.01
process bills (e.g., credit cards)	.60	.04	.28
record cash register transactions	.48	.03	.24
solve mathematical problems	.46	.15	-.05
prepare income tax returns	.44	.23	.14
process orders for merchandise	.47	.19	.25
diagnose medical problems	.13	.52	.02
diagnose psychological problems	.18	.70	.02
control welfare programs	.27	.44	.27
control weapons for national defense	.22	.43	.18
teach children in school	.20	.65	-.03
provide psychological counseling	.02	.62	.07
provide career counseling	.22	.53	.03
generate solutions to social problems	.04	.74	.10
match people for dating	-.03	.41	.13
keep records about radical groups	.02	.21	.56
store information about criminals	.13	.03	.47
send mail advertisements to the home	.09	-.10	.50
handle magazine subscriptions	.37	.04	.45
record political contributions	.16	.11	.55
keep information files on citizens	.04	.02	.62

Table 5

Means and Standard Deviations of Attitude Items

and Factor Scores

(1 = strongly agree/7 = strongly disagree)

Computers should be used to...	Mean	Standard Deviation
check credit references	2.16	1.07
electronically transfer funds	2.06	1.08
register for college courses	1.77	.88
prepare payroll checks	1.87	.97
count votes in an election	1.95	1.16
control factory machinery	3.17	1.62
process bills (e.g., credit cards)	2.02	.97
record cash register transactions	1.97	1.07
solve mathematical problems	1.62	.88
prepare income tax returns	2.34	1.16
process orders for merchandise	2.22	.93
FACTOR 1: QUANTITATIVE APPLICATIONS	2.10	.62
diagnose medical problems	3.84	1.92
diagnose psychological problems	5.30	1.66
control welfare programs	4.23	1.74
control weapons for national defense	4.25	1.92
teach children in school	5.01	2.00
provide psychological counseling	6.24	1.18
provide career counseling	3.51	1.87
generate solutions to social problems	5.15	1.62
match people for dating	5.30	1.50
FACTOR 2: DECISION-MAKING APPLICATIONS	4.76	1.10
keep records about radical groups	4.18	1.79
store information about criminals	2.33	1.31
send mail advertisements to the home	3.51	1.76
handle magazine subscriptions	2.48	1.09
record political contributions	2.70	1.38
keep information files on citizens	3.26	1.87
FACTOR 3: RECORD-KEEPING APPLICATIONS	3.07	.99

Table 5, Continued

Computers should be used to...	Mean	Standard Deviation
control airplane traffic	3.79	1.76
operate automobile warning systems	2.31	1.18
operate video games	1.96	1.22
score psychological tests	3.69	1.80
gather societal data (e.g., census)	2.23	1.25
forecast outcomes of elections	3.33	1.57